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Multi-scale movements of West African buffalos

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Analyses of movement patterns of free ranging animals at various scales can provide insights about underlying behavioural processes. Most studies have focused on animal movements at a single scale, ranging from very short scale movements pinpointing a memorized or directly perceived goal location to very large scale migratory movements. Beyond the inherent interest of these scale-specific studies, multi-scale movement behaviour studies address the question of how the various spatio-temporal scales an animal may have to deal with fit into each other. Based on a multi-scale study on West African buffalo, we show how movement behaviours involved in subdiffusive within-patch search (short scale), diffusive or ballistic inter-patch or water-directed transit (medium scale), subdiffusive home range roaming (large scale), and ballistic migratory events (very large scale) depend on each other. Movement data were obtained by extensive GPS-tracking of seven herds during several months, interspersed with intensive GSP-tracking sessions, in order to get information at the various possible scales. In parallel, the environment was monitored using remote sensing (satellite) data for the largest scales and detailed path-retracing for the shortest ones. Analyses reveal how the buffalo herds can simultaneously adapt their movements to the local habitat features.